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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Guenter Schneider

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EXAMINER

VILAKAZI, SIZO BINDA

ART UNIT

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3747

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/632,173	Applicant(s) SCHNEIDER ET AL.	
	Examiner SIZO B. VILAKAZI	Art Unit 3747	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 July 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7, 9-11 and 13-18 is/are rejected.
- 7) ☐ Claim(s) 8 and 12 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 06/30/2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Drawings

1. The drawings are objected to because the “tribologically stressed component , 10” described in the specification on Page 4, Line 32 is not labeled in either of the drawings submitted. Furthermore, the drawings submitted appear to be identical, and neither are labeled with a figure number. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1-7, 9, 10, 13, 14, 16, and 17 are rejected under 35 U.S.C. 102(e) as being anticipated by Campion et al (US Patent 6,802,457 B2).

4. In re Claim 1, Campion et al. disclose a subassembly of an internal combustion engine, comprising:

- a. a mating body (Fig. 1, Item 16)
- b. a tribologically stressed component having a surface area provided with a coating and that in operation, moves in relation to the mating body and is thereby tribologically stressed, wherein the coating is an at least mostly inorganic hard material coating (Fig 1, Item 14; Column 2, Line 65 through Column 3, Line 4; Column 4, Lines 1-5).

5. In re Claim 2, Campion et al. disclose a subassembly wherein a surface area of the mating body and the surface area of the tribologically stressed component are in frictional contact during operation (Column 2, Lines 65-67; Column 3, Lines 41-46)

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6. In re Claim 3, Campion et al. disclose a subassembly wherein a surface of the mating body is provided with another at least mostly inorganic hard material coating that has a same structure and a same composition as the at least mostly inorganic hard material coating on the surface area of the tribologically stressed component (Column 5, Lines 42-53).

7. In re Claim 4, Campion et al. disclose a subassembly as recited in Claim 1, wherein a solid-solid contact occurs between a surface area of the mating body and the surface area of the tribologically stressed component during operation (Column 2, Lines 65-67; Column 3, Lines 41-46).

8. In re Claim 5, Campion et al. disclose a subassembly wherein the solid-solid contact occurs without lubrication (Column 3, Lines 1-4).

9. In re Claim 6, Campion et al. disclose a subassembly wherein at least one of the at least mostly inorganic hard material coating on the tribologically stressed component and the other at least mostly inorganic hard material coating on the mating body includes several sublayers (Column 4, Lines 48-54).

10. In re Claim 7, Campion et al disclose a subassembly as recited in Claim 3, wherein the at least one of the at least mostly inorganic hard material coating and the other at least mostly inorganic hard material coating includes at least one of CrN, TiN, ZrN, VN, NbN, TiAlN, and CrAlN, to form a multiple layer (Column 4, Lines 1-5 and Lines 15-20, and Lines 48-54)

11. In re Claim 9, Campeon et al disclose a subassembly as recited in Claim 3, wherein at least one of the at least mostly inorganic hard material coating and the other at least mostly inorganic hard material coating includes one of a

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carbonitridic layer, a nitridic layer, an oxinitridic layer, and an oxidic layer

((Column 4, Lines 1-5).

12. In re Claim 10, Campion et al. disclose a subassembly wherein the at least one of the at least mostly inorganic hard material coating and the other at least mostly inorganic hard material coating is produced by one of a PVD operation and a PECVD operation (Column 5, Lines 54-58)

13. In re Claim 13, Campion et al. disclose a subassembly wherein at least one of the at least mostly inorganic hard material coating and the other at least mostly inorganic hard material coating has a thickness of 0.5 μm to 5 μm (Column 4, Lines 34-40).

14. In re Claim 14, Campion et al. disclose a subassembly wherein at least one of the at least mostly inorganic hard material coating and the other at least mostly inorganic hard material coating has a thickness of 1 μm to 3 μm (Column 4, Lines 34-40).

15. In re Claim 16, Campion et al disclose a method of using a subassembly of an internal combustion engine that includes a mating body and a tribologically stressed component having a surface area provided with a coating and that in operation, moves in relation to the mating body and is thereby tribologically stressed, wherein the coating is an at least mostly inorganic hard material coating, the method comprising:

- a. using the internal combustion engine operated with one of a dry gas such as natural gas and hydrogen as a fuel or under at least one of

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- oil-free conditions and water-free combustion conditions (Column 2, Line 65 through Column 3, Line 4).
12. In re Claim 17, Campion et al. disclose a gas engine, comprising:
- a. a subassembly including a mating body (Fig. 1, Item 16); and a tribologically stressed component (Fig 1, Item 14) having a surface area provided with a coating and that in operation, moves in relation to the mating body and is thereby tribologically stressed, wherein the coating is an at least mostly inorganic hard material coating (Fig 1, Item 14; Column 2, Line 65 through Column 3, Line 4; Column 4, Lines 1-5).

Claim Rejections - 35 USC § 103

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

14. Claims 15 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Campeon et al. as applied to claims 1 and 17 above.
15. In re Claim 15, Campion et al do not explicitly state the coated tribologically stressed component is an intake valve, a sealing seat, a guide area of an injection needle, or a seat area of the injection needle of one of an injection system and a fuel injector.

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16. However Campion et al state that coating other fuel injector components would be advantageous for the purposes of added lubrication and reduced scuffing (Column 5, Lines 47-53).

17. Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to have created a subassembly wherein one of the tribologically stressed component and the mating body includes one of an intake valve, a sealing seat, a guide area of an injection needle, and a seat area of the injection needle of one of an injection system and a fuel injector, in order to provide increased lubrication and reduced scuffing to the aforementioned fuel injector components.

18. In re Claim 18, Campion et al. do not explicitly disclose a gas engine wherein the gas engine includes one of a natural gas engine and a hydrogen engine.

19. However, Campion et al. state it would be advantageous to use the subassembly set forth when working with low lubricity fuels (Column 2, Line 65 through Column 3, Line 4).

20. Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the assembly disclosed by Campion et al. to work specifically with a natural gas engine, or a hydrogen gas engine, as the system would be able to compensate for the low lubricity of the natural or hydrogen gas.

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21. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Campion et al. as applied to claims 1 and 3 above, and further in view of Kotov et al (US PG Pub 2003/0027011 A1).

22. In re Claim 11, Campion et al. do not explicitly disclose a nanostructured layer as set forth in the claims.

23. However, Kotov et al discloses an inorganic coating system comprising a nanostructured layer to enhance corrosion inhibition of the underlying metal (Paragraph [0008], Lines 1-12)

24. Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the coating layer taught by Campion et al. with a nanostructured layer as set forth by Kotov et al. in order to provide improved corrosion inhibition.

Allowable Subject Matter

25. Claims 8 and 12 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

26. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Trudeau et al. (US Patent 6,519,847 B1) discloses a surface treatment of valve seats. Terakado et al. (US Patent 6,752,332 B1) teaches a fuel injector with a CrN coating. Dam et al. (US Patent 6,715,693 B1)

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teach fuel injector component coating. Ozawa et al. (US Patent 5,549,086), and Potter et al. (US Patent 5,771,873) teach the coating of the engine cylinder and piston with TiN or CrN for increased wear resistance. Deba et al. (US Patent 6,521,324 B1), Arpac et al. (US Patent 6,620,514 B2), Ferguson et al. (US Patent 6,022,590), and Serra et al. (US PG Pub 2003-0156313 A1) teach coating systems with nanostructured layers.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SIZO B. VILAKAZI whose telephone number is (571)270-3926. The examiner can normally be reached on M-F: 10:00am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen K. Cronin can be reached on (571) 272-4536. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Stephen K. Cronin/
Supervisory Patent Examiner, Art Unit 3747